Claims as amended under Article 34 of the PCT:

This listing of claims represents the claims as amended during the preliminary examination period during the international phase:

Listing of Claims:

1. (Original) An apparatus for compensation for aberrations or distortions of an optical system, comprising:

means for directing a beam of light through the optical system;

detector means for detecting the beam of light at at least two different focal planes after the beam of light has passed through the optical system; and

processing means for receiving data relating to the light at the two different focal planes from the detector and for processing the data to produce phase data relating to the wavefront of the beam of light emanating from the optical system by solving the transport of intensity equation to enable a transformation to be determined for transforming the data relating to the detected wavefront to a predetermined reference, and for applying the transformation to an image which has passed through the optical system to remove aberrations or distortions introduced by the optical system.

2. (Original) The apparatus of claim 1 wherein the detector comprises a charge coupled device.

3. (Original) The apparatus of claim 1 wherein the apparatus includes a light source for shining a parallel beam of light through the optical system and a beam splitter for directing reflected light from an article travelling back through the optical system to the detector for detection.

4. (Original) The apparatus of claim 1 wherein the apparatus includes a lens for focusing light passing through the optical system so as to obtain an image of an article viewed through the optical system.

5. (Original) The apparatus of claim 1 wherein the data to which the transformation is applied is intensity data.

6. (Original) The apparatus of claim 5 wherein the application of the transformation comprises a deconvolution of the intensity data.

7. (Original) The apparatus of claim 1 wherein the transformation is a propagation of the wave from one image location to another.

8. (Original) A method for compensating for aberrations or distortions in an optical system, comprising the steps of:

shining light through the optical system;

detecting the light at at least two different focal planes after the light has passed through the optical system;

producing phase data relating to the wavefront of light detected by the detector at the two different focal planes by solving the transport of intensity equation;

determining a transformation to transform the phase data in accordance with a known reference data;

and applying the transformation to data relating to an image of an article produced through the optical system so as to remove the effects of aberrations or distortions of the optical system on that data.

9. (Original) The method of claim 8 wherein the data to which the transformation is applied is data relating to the image of the object so that the image of the object is produced free

of distortions which would otherwise be introduced by the distortions or aberrations in the lens system.

10. (Original) The method of claim 8 wherein the detector comprises a charge coupled device.

11. (Original) The method of claim 8 wherein the data relating to the image is captured by directing a beam of light through apparatus including a lens for focusing light passing through the optical system so as to obtain an image of an article viewed through the optical system.

12. (Original) A fundus camera for producing an image of the fundus of a person's eye, said camera comprising:

a detector for detecting at at least two different focal planes a beam of light passing through the cornea and lens of a person's eye and reflected from the fundus of the person's eye and again passing through the lens and cornea of the person's eye;

processing means for determining phase data relating to the wavefront of the light beam detected by the detector at the two different focal planes by solving the transport of intensity equation and for producing a transformation required to convert the phase data from that detected by the detector to a known reference data;

the detector also being for detecting a beam of light directed through a person' s eye to obtain an image of the fundus and for producing phase data relating to that image; and

the processing means being for processing the phase data relating to the image in accordance with the transformation to transform the data relating to the image to compensate for aberrations and distortions introduced by the cornea and lens of the person's eye, and for producing a image of the fundus, which is therefore free of distortions and aberrations introduced by the cornea and lens of the person's eye.

13. (Original) The camera of claim 12 wherein the camera also includes a light source for producing the beams of light detecting by the detector.

14. (Original) The camera of claim 12 wherein the camera further includes a lens for focusing the beam of light towards the eye so that the beam of light which produces the image is reflected from the fundus so as to provide an image of the fundus.

15. (Original) The camera of claim 12 wherein the camera has a monitor for displaying a image of the fundus.

16. (Original) Apparatus for determining the amount of distortion or aberration of a lens system, comprising:

means for directing a beam of light through the optical system;

detector means for detecting the beam of light at at least two different focal planes after the beam of light has passed through the optical system; and

processing means for receiving data from the detector relating to the beam of light at the two different focal planes and for processing the data to produce phase data relating to the wavefront of the beam of light emanating from the optical system by solving the transport of intensity equation and for determining the amount of aberration or distortion of the lens system relative to reference phase data.

17. (Original) A method for determining aberrations or distortions in an optical system, comprising the steps of:

shining light through the optical system;

detecting the light at at least two different focal planes after the light has passed through the optical system;

producing phase data relating to the wavefront of light detected by the detector at the two different focal planes by solving the transport of intensity equation; and

comparing the phase data with a reference phase data to determine the difference and therefore the aberration or distortions introduced by the lens system.